

GRANULAR AGGREGATE RESOURCES AND SURFICIAL GEOLOGY
OF
SISSON BRANCH RESERVOIR (21 O/6)



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RESUME

La présente étude a pour but premier de cartographier à l'échelle de 1:50000 les dépôts meubles de sable et gravier dans la région correspondant au feuillet topographique 21 O/6 (Sisson Branch Reservoir). Une carte préliminaire de la géologie de surface a également été dressée. Les cartes sont accompagnées d'un rapport décrivant brièvement le contexte géologique, les méthodes de travail ainsi que les caractéristiques principales des différents types de dépôts meubles. Une évaluation sommaire du potentiel économique de ces dépôts est présentée et une compilation des observations de terrain complémente les cartes en fournissant de plus amples détails sur les principaux dépôts. La presque totalité des réserves de sable et gravier se retrouvent à l'intérieur des dépôts glaciaires de la vallée de la rivière Little Tobique. On évalue à environ 27 millions m³ le volume des ressources disponibles de sable et gravier.

ABSTRACT

This report provides an evaluation of the distribution, extent, thickness and quality of surficial granular aggregate deposits in the Sisson Branch Reservoir (21 O/6) map area. A preliminary surficial geology map accompanies the report. Major units of granular aggregate were mapped and some comments have been made on the origin of the deposits, the most important of which were sampled for the purpose of quality testing; calcula-

tions of reserve volumes were made for the major aggregate sources. The bulk of the reserves occur within the Little Tobique River valley train. Total recoverable reserves in the area are estimated at 27 million m³.

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INTRODUCTION

This report summarizes the results and findings of field investigations undertaken during the summer of 1983. The objectives of this study were: (1) to provide basic information on the distribution, extent, thickness and quality characteristics of granular aggregate deposits; and (2) to produce a surficial geology map. The report is directed to both producers and consumers of granular aggregates in their search for workable deposits, as well as land-use planners concerned with efficient resource utilization, including forest managers.

LOCATION OF THE STUDY AREA

The area under investigation covers approximately 1,110 km² and is situated in northwest New Brunswick. It is bounded by latitudes 47°30'/47°15' North and by longitudes 67°00'/67°30' West and covers the entire NTS map sheet, 21 O/6 (Figure 1).

PREVIOUS STUDIES

Gauthier (1982, 1983) mapped the area as part of a regional study of the surficial geology of northern New Brunswick. The results of that study, published by the Geological Survey of Canada, comprise a report and a series of 1:100,000 scale maps covering the area north of latitude 47°00'N. Rampton et al. (1984) have published a report on the Quaternary geology of New Brunswick as well as a 1:500,000 scale surficial geology map of the province.

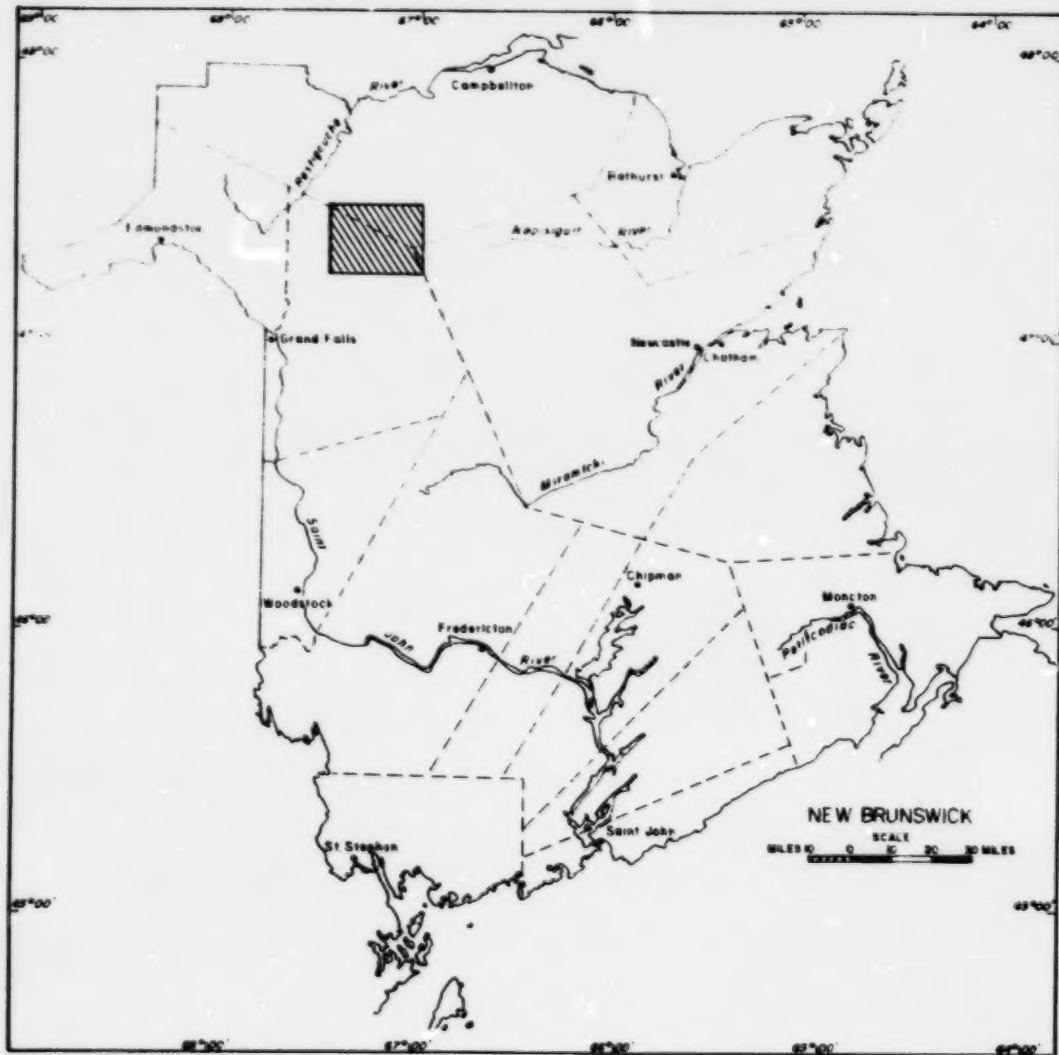


Figure 1. Location of study area.

Soils of the area have been examined by Langmaid et al. (1976) and Dubé (1982).

The bedrock geology has recently been mapped by Irrinki and Crouse (in preparation).

PHYSIOGRAPHY

The Sisson Branch Reservoir area lies almost totally within the Saint-Quentin Plateau, a physiographic subdivision of the Chaleur Uplands (Rampton et al., 1984) and a part of the Appalachian Region of Canada (Bostock, 1970). It consists of an upland surface of erosion, lying between 250 and 350 m, marked by a northeast-oriented, structurally controlled, ridge and valley system. The low-lying areas are generally underlain by calcareous rocks of the Matapedia Group. The gently undulating Matapedia terrane is broken only by residual hills of greywacke (e.g., Moose Mountain). Elevations range from 180 m to about 520 m. Relief is moderate and ranges from 75 to 100 m, except in the western part of the map area, where it reaches 150 m among a group of higher hills. Gesner Ridge is a prominent fault-scarp capped by a resistant basalt unit, which stands about 200 m above the alluvial plain of the Little Tobique River.

The mountainous extreme southeast corner of the map area is within the Northern Miramichi Highlands, a subdivision of the Miramichi Highlands (Rampton et al., 1984). Reardon Mountain, which rises to 670 m, is the highest landmark in the map area.

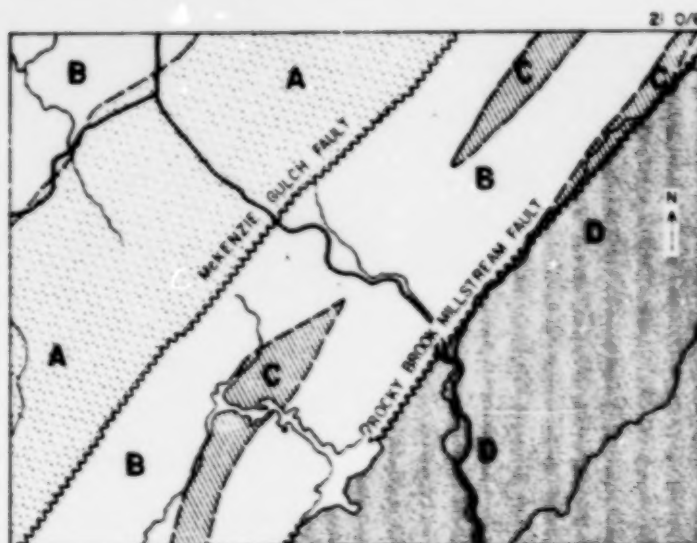
A trellis drainage pattern has developed over the landscape in response to the broad structural trends in the area. The Little Tobique River, the main watercourse, drains southwest to the Saint John River. For the upstream part of its course, it flows through a deeply incised U-shaped valley that follows the Rocky Brook-Millstream Fault. The Mamozekel River is the second stream in importance; it is a tributary of the Little Tobique River and similarly flows in a structurally controlled, glacially overdeepened U-shaped valley. A number of secondary streams are aligned along northwest-southeast faults. In the southeastern part of the map area, soft Devonian siltstones have been deeply dissected in an intricate, dendritic pattern. The area is generally well drained, except for some depressions around the Sisson Branch Reservoir. Glacial events have affected the lower course of the Little Tobique River. For example, above its junction with Four Mile Brook, the valley is partly blocked by a large moraine that has forced the river to entrench itself into a narrow gorge.

Except for Jardine Brook, which drains into the Restigouche River, all waterways drain into the Saint John River basin.

BEDROCK GEOLOGY

The distribution and age relationships of the major groups of rocks are shown in Figure 2.

The map area is underlain, in the west, by Ordovician-Silur-



LEGEND

LOWER DEVONIAN

- D Wapske Formation: siltstone and slate interbedded with quartzose sandstone and minor interbeds of limestone and quartz wacke; minor felsic and mafic volcanic rocks

UPPER ORDOVICIAN-LOWER SILURIAN

- C Unnamed Unit: slate, conglomerate, lithic wacke, and quartzose sandstone interbedded with minor calcareous siltstone and crystalline limestone
- B Matapedia Group: argillaceous limestone, lithic limestone, and shaly limestone with minor interbeds of calcareous siltstone and calcareous slate

ORDOVICIAN

- A Grog Brook Group: siltstone, quartzose sandstone; minor polymictic conglomerate and greywacke

Figure 2. Bedrock geology, modified after Crouse and Irrinki (1983).

ian turbidites of the Grog Brook Group, Matapedia Group, and an unnamed unit. In the eastern part of the map area, the Ordovician-Silurian rocks are in fault contact with Lower Devonian sedimentary and volcanic rocks of the Wapske Formation (Crouse and Irrinki, 1983).

The sedimentary sequence is folded into northeast-trending macroscopic folds (St. Peter, 1977) and possesses an axial planar, slaty cleavage that is especially pronounced in the Grog Brook Group rocks.

SURFICIAL GEOLOGY

Rampton et al. (1984) and Gauthier (1983) have summarized the sequence of events that ultimately led to the deglaciation of northwestern New Brunswick.

SUMMARY OF GLACIAL HISTORY

Some disagreement persists as to the timing and mode of glaciation of northwestern New Brunswick. Whereas Rampton et al. (1984) state that some "parts of the Northern Miramichi Highlands likely were glaciated only prior to the Wisconsin", Gauthier (1983) concludes that ice covered the entire area during the Late Wisconsin. The presence of tors and occurrences of grus, as well as other evidence of extensive physical weathering, has variously been explained as indicative of a long period of exposure to extreme weather conditions or of the presence of cold base, nonerosive ice.

In the map area, striated bedrock surfaces are rare owing, principally, to the marked susceptibility of the bedrock to fracture and breakage. Two principal trends have been noted: one generally east-west and the other north-south.

It is not known with certainty to what glacial phase the north-northeast- and the southeast-trending orientations correspond. They are inferred to represent a Late Wisconsin bifurcation of an easterly flow of ice around the emerging Northern Miramichi Highlands. The 119° striae (direction not confirmed) may be related to the Tuadook-Renous flow pattern (Rampton et al., 1984), whereas the 075° (direction not confirmed) and the 080° (direction confirmed by crag-and-tail) trending striae may indicate flow from the North Maine-Notre-Dame Mountains ice complex (Rampton et al., 1984) into the Baie des Chaleurs. The north-south orientations correspond to grooves on polished bedrock and suggest a northerly movement of ice from the radial flow of the North Maine-New Brunswick glacier.

The till that blankets the landscape is thin, generally less than 1 m, light olive-brown in color and commonly a silty gravel in texture (see Figure 3). Compositionally, the basal till closely reflects the local bedrock lithology, but in some cases, shows the effect of limited transport (e.g., calcareous till overlying Grog Brook terrane at location 06-119 suggests transport eastward, from the calcareous Matapedia terrane).

Final deglaciation of the map area occurred during the Plaster Rock phase (Rampton et al., 1984). During that phase,

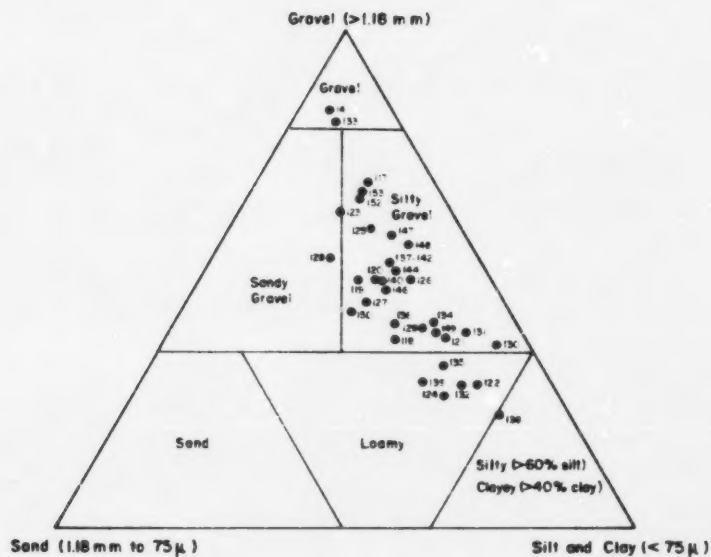


Figure 3. Grain size composition of till samples in map area 21 O/6.

glacier configuration became complex as the North Maine-Notre-Dame Mountains ice complex was disintegrating into small local ice centres and the emergent local topographic features were influencing the dispersion of glaciers. The range of hills in the northeast part of the map area eventually isolated a residual ice mass located in the Saint-Quentin-Kedgwick basin (the Saint-Quentin ice centre of Rampton et al., 1984). Meltwaters from the ablating ice carved many small channels on the plain near Saint-Quentin and along the valley slopes of the Salmon River.

Minor outwash may have been deposited across the range of hills via the Sisson Branch, Big Cedar, and Middle Brook valleys.

Rampton et al. (1984) postulate the existence of a large glacial lake in the lower reach of the Sisson Branch. Field evidence for such a large body of water is not convincing, but a reduced version of Glacial Lake Sisson is proposed, with a maximum stand elevation of 260 m (see Plate 84-480). Field evidence for Glacial Lake Sisson is limited to: (1) a sandy fluvial sequence overlying fine silty sand and silt, level-graded to a 260 m elevation, suggesting stream progradation in a lake basin; (2) a deltaic landform situated at the mouth of Barkerhouse Brook, level-graded to about 260 m elevation and exhibiting a steep southwest flank on pre-reservoir aerial photographs; (3) some silty sand patches below 260 m elevation. Glacial Lake Sisson probably resulted from blocking of the northeast-oriented arm of the present-day reservoir and of the Bogan Brook valley, as suggested by abundant accumulations of ice-contact and ablation material in that area.

Evidence for a separate but lower level (210 m) glacial lake has been observed in the Little Tobique valley in the vicinity of its confluence with Little Cedar Brook. A river section exposes fluvial sediments overlying finely laminated silts and silty sand. Fine sediments have also been reported near the mouth of Little Cedar Brook (Irrinki, personal communication) and their presence is also inferred from seismic surveys (see Appendix A). The lake probably owed its origin to a large moraine built across

the Little Tobique River valley in the vicinity of Four Mile Brook. Erosion of the outlet eventually led to draining of the lake and entrenchment of the river. Melting of ice in the Little Tobique valley was accompanied by the emplacement of an extensive valley train that includes lacustrine, glaciofluvial outwash and ice-contact sediments. Minor fluctuations of the ice are suggested by the occasional presence of a diamicton (till?) within the mainly fluvial sections.

TILL ANALYSIS

Till samples were analyzed to provide information on background concentration values of minor and trace elements and to help characterize the till (see Appendix E).

Geochemical determinations were made on the clay fraction ($<2 \mu$) of the till matrix for the same reasons stated by Stea and Fowler (1979):

- 1) Most samples (average sampling depth <2 m) have been stripped of labile components (sulphide and carbonate mineral grains) by weathering. The clay fraction fixes a proportion of the lost cations (Shilts, 1975).
- 2) The clay fraction contains most of the metal leached from weathered samples.
- 3) The clay fraction demonstrates relatively little depth variation when compared to sieved fractions containing sand- and silt-sized material.

Results of the analyses are presented in Appendix D.

GRANULAR AGGREGATE RESOURCES

FIELD AND LABORATORY METHODS

Information used in the determination of deposit boundaries and thicknesses was obtained by the examination of gravel pit faces and all other natural and man-made exposures that were encountered (see Appendices B and C). Several exposures were made or improved by the use of shovels and hand-augering equipment.

Samples of granular materials were collected from available exposures with a sample site distribution designed to provide a reliable assessment of material qualities in the major deposits. Care was taken to obtain samples that were as representative as possible. All samples were subjected to wet-sieve analysis to accurately determine the proportion of fine particles (less than 75 μm). Supplementary data obtained from the Department of Transportation (D.O.T.) were included in Appendix B. It included subsurface data obtained from augering operations and laboratory results of various tests performed on the granular aggregate material.

The average material depths used for volume calculations were arrived at by projecting the depths observed in pit excavations to areas beyond the pit boundaries, with the aid of geologic and topographic observations on the ground and from a study of the aerial photographs. Confidence in reserve figures is affected by the reliability of material thickness data and of deposit boundaries. In no case can reserve figures be absolutely

definitive. Traditional exploration methods, including detailed test-pitting or drilling with power equipment, will be required for accurate evaluation of reserves.

QUALITY LIMITATIONS

The potential of many local granular aggregate deposits for use as high specification aggregate is limited by three major factors:

1) Fine particles: A high content of fine particulate matter (finer than 75 μm) renders the material unsuitable for many uses, at least in the pit-run state. Washing can adequately lower the fine content but doing so increases the cost of exploitation.

Ablation till and some ice-contact deposits are specially affected by this condition.

2) Clast lithotypes: High specification coarse aggregate should consist of hard, strong, uncoated, durable particles of crushed stone or gravel. Certain lithotypes are in general more resistant to breakdown than others. The lithologic analyses recorded in Appendix B divide the lithologic components into two groups according to whether they are regarded as being sound or unsound. The test is qualitative, being based on the determination of the lithotype of each clast in the sample and on its resistance to disintegration under impact. This test should not be confused with quantitative soundness tests employing sodium or magnesium sulphate (C88-73, A.S.T.M., 1974).

In general, the quality of the gravel found in the map area is moderate to poor.

3) Alkali-reactivity: Fine aggregate for use in concrete that will be subject to frequent wetting, extended exposure to humid atmosphere, or in contact with moist ground should be free of reactivity with alkalis in cement which may produce excessive expansion in, or cause deterioration of, the concrete.

SOURCES OF GRANULAR AGGREGATE

Little Tobique River Valley Train: Extensive accumulations of glaciofluvial material occupy the Little Tobique River valley. Lack of exposures creates difficulties in assessing the quality characteristics of individual deposits. Deposits consist of all grades of material varying from lacustrine clays and silts to texturally variable ice-contact sediments, and to well-graded fluvial and glaciofluvial sand and gravel deposits. River sections and seismic data (Appendix A) indicate that large thicknesses of material are present locally.

Estimated reserves for the valley train are in the order of 18 million m^3 , but quality and grade are expected to show significant variation throughout.

The outwash delta at the mouth of Little Cedar Brook and the large outwash terrace in the vicinity of Three Mile Brook offer the best potential for crushed aggregate and well sorted sand and gravel. Combined reserves are estimated at a minimum of 3 million m^3 .

The modern alluvial terrace has reserves evaluated at 2.5 million m³, but locally, extraction of material may be limited by a high water table.

Other Deposits: The Mamozekel River valley is characterized by a wide alluvial plain. Available exposures and seismic data suggest that extraction depths are shallow.

Along the Five Fingers Brook valley, ice-contact glacio-fluvial ridges have supplied source material for crushed aggregate in the Saint-Quentin area.

Ice-contact and ablation till material in the Round Bogan Brook area have supplied fill during construction of the Sisson Branch Reservoir project.

Other areas mapped as ablation till have supplied limited volumes of low grade material for local road maintenance. Morainic ridges in the Big Cedar Brook area offer some potential although much textural variability is expected.

Extraction activity during 1983 is summarized in Figure 4.

CONCLUSIONS

Recoverable reserves of granular aggregate material in the study area are estimated at 27 million m³. Nearly 90 percent of the available aggregate is located in the Little Tobique River.

Reserve estimates do not completely account the effect of various physical, cultural or economic factors which limit or restrict access to these reserves.

Some deposits that were too small to be considered a reserve were not included in the total estimate, but may represent valuable resource deposits for local construction and road improvement activity. These small deposits will naturally assume a more important role based upon their proximity to end use. Large accumulations of ablation till were not included in the total reserve figures because of the low grade nature of these deposits. They do, however, represent a good potential source of abundant low grade fill.

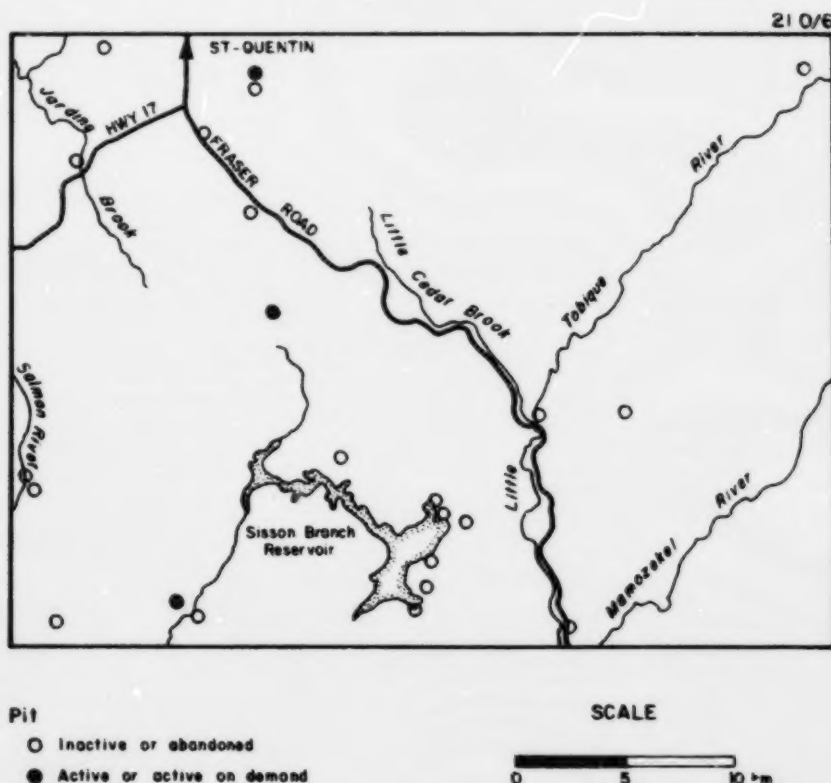


Figure 4. Status of sand and gravel pits in 1983.

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APPENDIX A

HAMMER REFRACTION SEISMIC SURVEYS

1983

In the absence of subsurface data, the hammer-seismic technique has been used locally to determine the thickness of granular aggregate material.

In the table below, the symbol "V" refers to the velocity of an induced seismic wave in a layer of material of thickness "D". Velocities less than 1500 m/sec are interpreted as indicative of sand and gravel. Faster velocities indicate till, clay or bedrock. The study sites are identified by their UTM grid location.

LOCATION	UTM	V ₁	V ₂	V ₃	D ₁	D ₂
S-1	382 383	1048	1184	2416	5.4	16.4
S-2	381 386	417	867	1631	1.8	12.1
S-3	378 383	611	1100	2000	3.2	8.3
S-4	384 363	777	900	3000	2.0	7.7
S-5	377 392	625	954	1714	3.2	13.9
S-6	379 396	800	1365	-	2.3	27.3
S-7	380 399	588	1250	2250	6.3	8.3
S-8	379 402	500	1156	1764	2.8	10.0
S-9	379 411	500	1066	1692	1.2	4.5
S-10	380 415	395	3000	-	7.4	-
S-11	382 414	500	1150	4000	2.5	11.0
S-12	382 406	357	4625	-	7.6	-
S-13	381 395	619	1310	-	5.1	24.4
S-14	373 445	643	1632	-	3.3	22.7
S-15	370 444	571	1675	-	3.2	23.8
S-16	367 448	529	1477	-	3.8	25.1
S-17	365 443	250	1357	3000	1.2	6.7

S-18	363 440	666	1666	3250	2.0	4.2
S-19	383 452	400	1465	-	24.1	-
S-20	383 457	618	1710	-	7.9	22.7
S-21	388 465	400	615	1429	0.7	4.8
S-22	389 474	760	-	-	23.1	-
S-23	395 483	714	1622	-	5.0	23.6
S-24	438 533	500	1333	3429	2.7	6.1
S-25	448 551	444	760	2154	1.3	7.9
S-26	451 555	2465	-	-	19.5	-
S-27	455 560	700	4083	-	6.3	-
S-28	212 357	350	3938	-	4.1	-
S-29	208 361	615	2320	-	3.8	17.1
S-30	208 390	416	1739	-	4.7	15.8
S-31	257 481	273	3278	-	2.3	-
S-32	261 479	462	4444	-	3.6	-
S-33	262 473	400	1286	3643	1.4	4.3
S-34	269 464	300	1760	-	3.4	16.0
S-35	270 454	400	1474	3000	3.0	10.1
S-36	352 541	333	2500	-	3.1	-
S-38	505 453	833	1500	4125	1.9	6.0

APPENDIX B

SAMPLE DESCRIPTIONS

OF

SISSON BRANCH RESERVOIR

MAP AREA 21 O/6

LOCATION #: 06-8

NTS: 21 0/6

Type of Deposit: Outwash

County: Victoria

Exposure Type: Pit

Parish: Drummond

Status: Inactive

UTM: 162 562

SECTION DESCRIPTION & COMMENTS:

0.6 m Overburden: Fine, very poorly sorted material.

0.4 m Gravel: Moderately sorted loose cobbly pebble gravel and sand with silt-coated clasts; some calcium carbonate deposition on clasts; pebbles are subrounded to rounded.

7.0 m Slump Covered: Assumed to be mainly sand and gravel.

In general, gravel is horizontally bedded. A few sand horizons were noted, but exposures generally exhibit gravelly material.

D.O.T. (1976) tested the material at the site:

Percentage finer than 75 μ m	- range 2.9% to 9.6%; mean 5.3%
Los Angeles abrasion loss	- 28.3%, 30.3%, 31.1%
Soundness loss (crushed agg.)	- range 2.66% to 7.71%
Sand equivalent	- range 20 to 75
Proposed use	- asphaltic concrete

(OVER)

MECHANICAL ANALYSIS:

sieve	31.5	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600 μ m	300 μ m	150 μ m	75 μ m
% passing	88.8	78.2	72.7	55.6	41.1	25.6	14.7	8.7	6.1	5.1	4.4

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 23%		Sound Lithotypes 77%	
slate 12; sandstone 9; calcite 1; siltstone 1		limestone 63; sandstone 11; siltstone 3	

ESTIMATION OF RESERVES:

total deposit area (hectares)	area workable (hectares)	average thickness (metres)	recoverable reserves (m ³) probable
25	5	2	100,000

LOCATION #: 06-8

(cont'd)

Large volumes of material have been extracted, processed on site, and used for improvement. Reserves are diminishing but a significant volume of granular aggregate remains. The quality of the material is good, due mostly to the high proportion of limestone pebbles in the gravel.

LOCATION #:	06-32	NTS:	21 0/6
Type of Deposit:	Outwash	County:	Victoria
Exposure Type:	Pit	Parish:	Drummond
Status:	Active on demand	UTM:	254 482

SECTION DESCRIPTION & COMMENTS:

At 06-32, a small pit has been excavated in material consisting of loose, coarse sand and pebble gravel. Clasts are commonly flat or elongate and generally subrounded; the maximum size observed is about 20 cm. The average section height is 2.5 m. A high proportion of siltstone in the gravel decreases the quality of the aggregate.

A linear deposit of outwash has been mapped along the Sisson Branch river, south of 06-32. At 06-50, a river cut displays the following section:

0.5 m Sand: Coarse, stony, oxidized, poorly sorted silty sand.

3.0 m Sand: Stratified and well sorted grey sand and pebbly sand.

0.5 m Silt: Olive colored (54 5/4) fine laminated silt and silty sand.

The coarsening upward sequence suggest that the material was deposited as prograding outwash into a standing body of water, probably Glacial Lake Sissor.

Seismic tests indicate that the thickness of the outwash ranges between 1.5 and 3.5 m.

MECHANICAL ANALYSIS:

sieve	31.5	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% passing	96.3	93.6	91.1	71.8	53.5	34.4	18.4	8.7	4.5	3.3	2.6

LITHOLOGIC ANALYSIS:

Unsound Lithotypes	68%	Sound Lithotypes	32%
siltstone 42; sandstone 19; weathered 6; quartz 1		siltstone 20; sandstone 12	

ESTIMATION OF RESERVES:

total deposit area (hectares)	area workable (hectares)	average thickness (metres)	recoverable reserves (m ³) probable
45	7	2	140,000

LOCATION #:	06-57	NTS:	21 0/6
Type of Deposit:	Ablation till	County:	Restigouche
Exposure Type:	Pit	Parish:	Eldon
Status:	Abandoned	UTM:	503 612

SECTION DESCRIPTION & COMMENTS:

0.4 m Overburden: Soil horizon.

0.6 m Sand and Gravel: Silty sand and pebble gravel. Maximum pebble size in section is 10 cm; some small boulders and large cobbles observed in the pit. Material is moderately compact to moderately loose. Bedding is poorly defined; presence of thin lenses of loose fine pebble gravel. Clasts are angular to subrounded. Volcanic lithotypes are ubiquitous.

3.0 m Slump Covered: Assumed to be sand and gravel.

Reserves are limited and quality of aggregate is poor. The deposit was a source of borrow material for the upgrading of local access roads.

MECHANICAL ANALYSIS:

sieve	31.5	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% passing	85.9	82.8	78.1	60.3	42.2	27.6	19.8	14.9	11.8	10.3	9.1

LITHOLOGIC ANALYSIS:

Unsound Lithotypes	84%	Sound Lithotypes	16%
sandstone 34; siltstone 20; weathered 19; mafic volcanic 7; felsic volcanic 4		sandstone 6; Mafic volcanic 5; felsic volcanic 3; siltstone 1; quartz 1	

ESTIMATION OF RESERVES:

total deposit area (hectares)	area workable (hectares)	average thickness (metres)	recoverable reserves (m ³) probable
			Limited

LOCATION #:	06-61	NTS:	21 0/6
Type of Deposit:	Alluvial	County:	Restigouche
Exposure Type:	Pit	Parish:	Eldon
Status:	Inactive	UTM:	495 611

SECTION DESCRIPTION & COMMENTS:

0.7 m Overburden: Soil horizon and stony silty diamicton.

0.9 m Sand and Gravel: Stratified, moderately sorted, medium sand, pebbly sand and pebbly gravel.

2.0 m Slump Covered: Assumed to be sand and gravel.

Limestone and slate bedrock is exposed at the base of the pit. Well rounded volcanic lithotypes are common. The deposit is shallow, of limited extent, and occurs as a poorly defined terrace.

MECHANICAL ANALYSIS:

sieve	31.5	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% passing	97.7	94.3	89.8	66.6	49.4	36.8	25.6	16.4	10.5	8.8	7.8

LITHOLOGIC ANALYSIS:

Unsound Lithotypes	74%	Sound Lithotypes	26%
siltstone 27; sandstone 16; weathered 16 slate 6; limestone 5; calcite 3; mafic volcanic 1		siltstone 10; limestone 9; felsic volcanic 2; mafic volcanic 2; sandstone 2 felsic intrusive 1	

ESTIMATION OF RESERVES:

total deposit area (hectares)	area workable (hectares)	average thickness (metres)	recoverable reserves (m ³) probable
			Limited, local importance only

LOCATION #:	06-69	NTS:	21 0/6
Type of Deposit:	Ice-contact	County:	Restigouche
Exposure Type:	Roadcut	Parish:	Saint-Quentin
Status:	Undeveloped	UTM:	335 590

SECTION DESCRIPTION & COMMENTS:

0.4 m Overburden: Soil horizon.

0.7 m Gravel and Sand: Coarse sand and pebble gravel. Material is moderately loose, oxidized and moderately sorted; clasts are subrounded and up to 15 cm in diameter (sample B).

0.2 m Sand and silt: Bedded, fine sand and silt (sample A).

0.3 m Gravel: Coarse, sandy, cobbly pebble gravel, poorly sorted. Clasts measure up to 30 cm in diameter.

1.0 m Slump Covered: Assumed to be gravel.

Ridges and conical hills of ice-contact glaciofluvial material are found within an ablation till deposit in the upper reach of Big Cedar Brook valley. A small lake, west of 06-69 is enclosed by ice-contact ridges. Some shallow outwash material occurs along the road leading south from 06-69.

Substantial volumes of material are present within the boundaries of the deposit but irregularity of the surface morphology and expected textural variability limit the usefulness of the deposit. The most significant accumulations occur in the vicinity of 06-69.

MECHANICAL ANALYSIS:

sieve	31.5	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% passing A				100.0	99.3	98.4	97.0	94.0	86.0	66.3	39.0
B	92.6	83.6	81.0	64.6	48.3	33.3	21.0	12.9	8.0	5.5	4.2

LITHOLOGIC ANALYSIS:

Unsound Lithotypes	78%	Sound Lithotypes	22%
siltstone 37; sandstone 22; weathered 15; slate 4		siltstone 13; sandstone 9	

ESTIMATION OF RESERVES:

total deposit area (hectares)	area workable (hectares)	average thickness (metres)	recoverable reserves (m ³) probable
275	30	2	600,000

LOCATION #:	06-80	NTS:	21 0/6
Type of Deposit:	Outwash	County:	Victoria
Exposure Type:	Pit	Parish:	Lorne
Status:	Abandoned	UTM:	375 445

SECTION DESCRIPTION & COMMENTS:

1.5 m Sand and Gravel: Well stratified, horizontally bedded, sand, sandy gravel and pebble gravel. Significant vertical textural variation, but lateral uniformity. Clasts are well rounded to subrounded.

An extensive valley train deposit occupies the valley of the Little Tobique River. Poor access and the lack of good exposures complicate the interpretation of the surficial geology within this broad valley. Ice-contact deposits, including esker ridges suggest that during ice retreat, meltwaters were draining south, probably into a lake, ponded against a large moraine which blocks the Little Tobique valley south of 06-80 (see 06-130). Rhythmites are found at the base of some river cuts. Outwash sediments are also associated with the ice-contact deposits.

Large volumes of granular aggregate are present in the Little Tobique River valley, but the overall quality of the valley train is poorly known. Test-pitting will be necessary to locate acceptable sources of material for usage other than borrow. Reserves estimate has been calculated for the entire valley train.

A few sections along the Little Tobique River provided more information on the types of material present in the valley train. The following are some selected examples:

(OVER)

MECHANICAL ANALYSIS:

sieve	31.5	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% passing	94.1	90.5	85.8	68.7	48.1	28.5	17.1	8.9	3.6	2.3	1.9

LITHOLOGIC ANALYSIS:

Unsound Lithotypes	69%	Sound Lithotypes	31%
siltstone 44; sandstone 15; calcite 7; weathered 3		limestone 14; sandstone 11; siltstone 5; quartzite 1	

ESTIMATION OF RESERVES:

total deposit area (hectares)	area workable (hectares)	average thickness (metres)	recoverable reserves (m ³) probable
921		2	18 million

LOCATION #: 06-80

(cont'd)

06-130 (UTM 384 399):

Roadcut in moraine complex. Stratified sandy pebble gravel and till.

2 m Gravel: Variably sorted, from clean to silty, mainly fine pebble gravel with some sand. Locse and well stratified.

1 m+ Till: Dense, compact, stony, clayey silt till; calcareous, light olive-brown.

06-92 (UTM 373 435):

Coarsening upwards section showing 6 to 8 m of rhythmites (varves?) at the base, gradually changing into fluvial sand and gravel. The 15 m section represents the shallowing of a lake and the gradual passage into a fluvial environment, probably as a result of down-cutting of an outlet in the large moraine at 06-130.

06-83 (UTM 408 495):

A 9 m section, mostly slumped, displays poorly sorted silty sand, sand and coarse gravel. At mid-slope, coarse pebble gravel, well-sorted and clast-supported, was observed. The material is probably of ice-contact origin.

06-89 (UTM 448 553):

A trench exposed the following section:

0.4 m Overburden: Gravelly loam.

0.5 m Gravel: Oxidized sandy pebble gravel.

0.05 m Silt: Light olive-brown silt diamicton, moderately compact with a few small pebbles.

0.05 m Silt: Brown pebbly clay silt diamicton (till?).

0.3 m+ Gravel: Grey, unoxidized sandy pebble gravel.

06-90 (UTM 459 564):

About 1 m sandy gravel overlying 30 cm very compact brown clay silt diamicton (till?) overlying 1 m+ moderately compact brown silt to fine silty sand.

A seismic study (see map and Appendix A) suggest that accumulations of sand and gravel exceed 20 m in some parts of the valley train.

LOCATION #: 06-96 NTS: 21 0/6
 Type of Deposit: Ice-contact County: Victoria
 Exposure Type: Pit Parish: Denmark
 Status: Active on demand UTM: 213 355

SECTION DESCRIPTION & COMMENTS:

2.0 m Sand: Moderately sorted, mainly coarse sand, in places pebbly. Clasts are rounded to well rounded and lithologically varied although grey sedimentary clastics dominate. Largest size observed: 10 cm diameter. Strata appears to dip towards the east.

2.5 m Slump Covered: Assumed to be mainly sand.

MECHANICAL ANALYSIS:

sieve	31.5	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% passing	89.5	84.3	78.4	63.0	52.5	42.0	31.9	20.5	8.8	4.0	2.7

LITHOLOGIC ANALYSIS:

Unsound Lithotypes	55 %	Sound Lithotypes	45 %
siltstone 43; sandstone 8; calcite 2; weathered 2		limestone 28; sandstone 12; siltstone 5	

ESTIMATION OF RESERVES:

total deposit area (hectares)	area workable (hectares)	average thickness (metres)	recoverable reserves (m ³) probable
11	3	5	150,000

LOCATION #: 06-105

NTS: 21 0/6

Type of Deposit: Ice-contact

County: Victoria

Exposure Type: Pit

Parish: Drummond

Status: Inactive

UTM: 144 408

SECTION DESCRIPTION & COMMENTS:

4.0 m Sand and Gravel: Moderately sorted, crudely bedded, gravelly sand to sandy gravel. Clasts are generally subrounded but vary throughout from angular to well-rounded. The maximum observed size is 40 cm. Important vertical textural variation.

11.0 m Slump Covered: Assumed to be mainly sand and gravel.

MECHANICAL ANALYSIS:

sieve	31.5	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% passing	95.1	93.5	89.0	71.0	54.5	37.3	21.9	12.1	7.1	5.2	4.3

LITHOLOGIC ANALYSIS:

Unsound Lithotypes	59 %	Sound Lithotypes	41 %
siltstone 25; sandstone 22; slate 5; calcite 5; quartz 1; weathered 1		sandstone 17; limestone 17; siltstone 7	

ESTIMATION OF RESERVES:

total deposit area (hectares)	area workable (hectares)	average thickness (metres)	recoverable reserves (m ³) probable
3	1	5	50,000

LOCATION #: 06-110

NTS: 21 0/6

Type of Deposit: Ice-contact

County: Victoria

Exposure Type: Pit

Parish: Lorne

Status: Abandoned

UTM: 333 400

SECTION DESCRIPTION & COMMENTS:

Sections in pit, range in height from 4 to 5 m and are badly slumped. Some sections show a stony silt diamicton in the upper part that may be till. Few clasts are larger than 15 cm. The overall texture is variable and probably a combination of ablation till and glaciofluvial material. The deposit was a source of fill during construction of dams for the Sisson Branch Reservoir.

Substantial reserves of material are probably found in the Bogan Brook Valley deposit but quality is probably generally low due to the morainic character of the deposit. Limited access and lack of good exposures prevent a more accurate assessment of the aggregate potential of this deposit.

MECHANICAL ANALYSIS:

sieve	31.5	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% passing	98.8	97.2	89.3	69.8	49.2	30.7	17.8	10.1	7.5	6.4	5.4

LITHOLOGIC ANALYSIS:

Unsound Lithotypes	78 %	Sound Lithotypes	22 %
siltstone 52; sandstone 21; calcite 4; weathered 1		limestone 12; siltstone 6; sandstone 4	

ESTIMATION OF RESERVES:

total deposit area (hectares)	area workable (hectares)	average thickness (metres)	recoverable reserves (m ³) probable
			Significant but probably low grade

LOCATION #:	06-112	NTS:	21 0/6
Type of Deposit:	Ice-contact	County:	Victoria
Exposure Type:	Pit	Parish:	Lorne
Status:	Abandoned	UTM:	329 383

SECTION DESCRIPTION & COMMENTS:

An 8 m slumped section exposes loose well sorted, fine pebble gravel and sandy gravel. The material is well stratified and the bedding suggests a paleoflow direction to the northeast. Clasts are rounded to subrounded and commonly calcareous.

The reserves estimate is conservative and includes all the glaciofluvial deposits mapped along the periphery of the central and eastern portions of the Sisson Branch Reservoir. A deposit located at the mouth of Barkerhouse Brook has been interpreted as an outwash delta built into Glacial Lake Sisson. Material in this deposit may be better graded than in the ice-contact deposits.

MECHANICAL ANALYSIS:

sieve	31.5	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% passing	98.3	95.0	90.7	63.5	36.8	18.7	11.9	8.6	6.0	4.2	3.1

LITHOLOGIC ANALYSIS:

Unsound Lithotypes	31 %	Sound Lithotypes	69 %
sandstone 19; siltstone 6; limestone 4; calcite 2		limestone 55; sandstone 9; siltstone 5	

ESTIMATION OF RESERVES:

total deposit area (hectares)	area workable (hectares)	average thickness (metres)	recoverable reserves (m ³) probable
100	-	2	2 million

LOCATION #: 06-113

NTS: 21 0/6

Type of Deposit: Ice-contact

County: Victoria

Exposure Type: Pit

Parish: Lorne

Status: Abandoned

UTM: 324 360

SECTION DESCRIPTION & COMMENTS:

All pit faces were badly slumped and partly overgrown. Hand excavations show pebbly gravel and sand. Clasts are subangular to subrounded and up to 20 cm in diameter. Sections average 5 m in height.

The material was probably used during the construction of the Sisson Branch Reservoir project.

MECHANICAL ANALYSIS:

sieve	31.5	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% passing	96.7	91.0	83.6	59.5	44.3	33.6	25.4	18.2	12.1	9.3	7.1

LITHOLOGIC ANALYSIS:

Unsound Lithotypes	33 %	Sound Lithotypes	67 %
siltstone 22; calcite 5; sandstone 3; weathered 2; slate 1		limestone 55; sandstone 7; siltstone 5	

ESTIMATION OF RESERVES:

total deposit area (hectares)	area workable (hectares)	average thickness (metres)	recoverable reserves (m ³) probable
			See 06-112

LOCATION #:	06-115	NTS:	21 0/6
Type of Deposit:	Outwash	County:	Restigouche
Exposure Type:	Pit	Parish:	Saint-Quentin
Status:	Inactive	UTM:	172 614

SECTION DESCRIPTION & COMMENTS:

A small borrow pit exposes sections ranging in height from 2 to 4 m. Limestone bedrock is exposed at the base of the pit. Material observed in sections is compact, coarse and poorly sorted, consisting mostly of cobbly pebble gravel with a sand matrix. There are some zones of looser, pebble gravel. Clasts are subrounded to rounded and up to 30 cm in diameter.

Many channels scar the landscape. Most of these features are erosional, but some sand and gravel can be found in larger channelized zones such as 06-115.

MECHANICAL ANALYSIS:

sieve	31.5	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600µm	300µm	150µm	75µm
% passing	71.3	61.5	49.6	39.3	35.3	31.8	27.7	23.2	19.3	15.8	12.6

LITHOLOGIC ANALYSIS:

Unsound Lithotypes	13%	Sound Lithotypes	87%
siltstone 7; sandstone 3; calcite 2; weathered 1		limestone 86; sandstone 1	

ESTIMATION OF RESERVES:

total deposit area (hectares)	area workable (hectares)	average thickness (metres)	recoverable reserves (m ³) probable
			Limited and patchy

LOCATION #: 06-116

NTS: 21 0/6

Type of Deposit: Ice-contact

County: Restigouche

Exposure Type: Pit

Parish: Saint-Quentin

Status: Active on demand

UTM: 245 602

SECTION DESCRIPTION & COMMENTS:

Large volumes of aggregate have been extracted from this deposit. The average section height in the pits is 4 m. Material exposed is very variable: from massive silt to slaty, grey, coarse well sorted sand and sandy cobbly pebble gravel. Contacts between beds are commonly sharp and erosional. Slumped bedding and faulting indicates an ice-contact mode of emplacement. The material is well stratified but exhibits sharp lateral and vertical textural changes. Clasts are moderately well rounded.

Crushed fine aggregate was stockpiled in pit at time of visit. D.O.T. (1967, 1971) tested the material at the site. Results are summarized below:

Percentage finer than 75 μ m	- range 1.3% to 8.6%; mean 4.5%
Los Angeles abrasion loss	- range 25.3% to 19.4%; mean 26.0%
Recommended usage	- borrow, subbase, base coarse aggregate

Supplementary reserves of granular aggregate may be present as flanking outwash in the Five Fingers Brook valley, but test-pitting will be necessary to identify favourable extraction sites. The outwash is generally thought to be patchy and shallow.

MECHANICAL ANALYSIS:

sieve	31.5	25mm	19mm	9.5mm	4.75mm	2.36mm	1.18mm	600 μ m	300 μ m	150 μ m	75 μ m
% passing A			100.0	99.0	94.4	77.4	43.2	10.0	3.0	2.5	2.3
B	89.8	84.6	79.4	71.2	66.1	59.4	46.9	20.0	6.9	3.5	2.5

LITHOLOGIC ANALYSIS:

Unsound Lithotypes 28%

siltstone 13; sandstone 12; weathered 2;
calcite 1

Sound Lithotypes 72%

limestone 47; sandstone 18; siltstone 7

ESTIMATION OF RESERVES:

total deposit area (hectares)	area workable (hectares)	average thickness (metres)	recoverable reserves (m ³) probable
11	2	4	80,000

APPENDIX C

SUPPLEMENTARY FIELD OBSERVATIONS

06-7

UTM 166 543

Small terrace: 60 cm of compact yellow-brown, fine-textured diamicton (till?) with some small rock fragments, overlying poorly sorted, moderately loose, rounded pebble gravel.

06-20

UTM 217 571

Borrow pit. Veneer of olive, silt till with abundant shattered and weathered slate fragments. Shattered bedrock is exposed at the base of the pit.

06-22

UTM 263 527

Poorly developed outwash deposit consisting of a loose silty sand and pebble gravel. Clasts are usually less than 1 cm in diameter, elongate and subangular to rounded. Sorting is moderate and the fines content is excessive.

06-25

UTM 243 541

Hillside trench exposing a 2.5 m section: loose to moderately loose sand and pebble to cobble gravel with angular clasts overlying bedrock. Probable origin: ablation till.

06-47

UTM 197 496

Trench exposing a 2 m section of coarse, cobbly sand and gravel. Clasts are generally well-rounded and there is a net predominance of hard limestone pebbles, probably originating in the Matapedia terrane a few kilometres northwest. Small ablation till deposit or poorly developed ice-contact glaciofluvial material.

06-50

(see 06-32 in Appendix B)

06-55

UTM 287 426

Shallow borrow pits developed in shattered bedrock, along southwest slope of Moose Mountain. Sections expose about 1 m of stony sand till over deeply shattered bedrock.

06-76

UTM 289 507

Low mounds of glaciofluvial material, of ice-contact origin. Rounded pebbles along road and in hand excavation. Moderately loose sand and coarse pebble gravel.

06-83

(see 06-80 in Appendix B)

06-86

UTM 418 449

Roadcut showing about 1 m of moderately loose, poorly sorted, pebbly sandy silt; ablation till or poorly developed ice-contact glaciofluvial sediments.

06-89, 06-90, 06-92

(see 06-80 in Appendix B)

06-95

UTM 195 363

Roadcut shows abundant flat and rounded clasts, representing perhaps a washed surface (Glacial Lake Sisson beach?) or a shallow glaciofluvial deposit associated with the esker at 06-96.

06-100

UTM 411 348

Small excavation showing well stratified, well sorted, loose, pebble gravel and sandy pebble gravel. Alluvial sediments of the Mamozekel River.

06-111

UTM 341 399

Excavation in deeply weathered gabbro. Slate bedrock outcrops on floor of excavation. Borrow material, probably used during construction of dams for Sisson Branch Reservoir.

06-130

(see 06-80 in Appendix B)

06-15

UTM 157 345

Small roadside excavation showing 1 to 2 m of dirty pebble gravel and silty sand with till inclusions overlying slate bedrock. Material used locally to upgrade forest access roads.

06-154

UTM 278 418

Small glaciofluvial deposit of probable ice-contact origin. Strata appears to dip towards the east. This feature may be a small kame delta built into Glacial Lake Sisson.

APPENDIX D

TILL TEXTURAL, LITHOLOGICAL AND GEOCHEMICAL DATA

(Till sample localities are shown on Plate 84-480 in back pocket)

SAMPLE NO.	UTM	TEXTURE %		PEBBLE LITHOLOGY %				TRACE ELEMENTS (CLAY FRACTION)														COLOR (MOIST)	BEDROCK
		Gravel	Sand	Silt & Clay	Calcareous Sedimentary	Noncalcareous Sedimentary	Igneous	pH	Cu	Pb	Zn	Mn	Co	Ni	Ag	Fe	Mo	W					
117	219 545	69	11	20	-	100	-	5.6	*	*	*	*	*	*	*	*	*	*	2.5Y 4.5/4	Os			
118	278 495	38	22	40	67	33	-	6.7	72	38	157	688	46	164	2.0	6.1	<2	20	2.5Y 4/2	OSs			
119	160 520	50	22	28	96	4	-	8.6	80	53	142	1223	45	192	2.0	6.1	<2	20	2.5Y 4.5/4	Os			
120	228 462	50	19	31	-	100	-	6.0	71	38	118	857	38	188	2.0	5.4	<2	20	2.5Y 4.5/4	Os			
121	220 399	38	13	49	33	67	-	7.5	54	30	126	500	30	148	1.5	5.3	<2	16	2.5Y 5.5/4	OSs			
122	286 440	29	12	59	18	82	-	6.2	84	41	144	1018	43	142	2.0	6.2	<2	*	2.5Y 5/4	OSu			
123	323 415	64	18	18	-	100	-	5.7	*	*	*	*	*	*	*	*	*	*	10YR 4.5/6	OSs			
124	345 374	27	19	54	-	100	-	6.8	68	45	126	1375	43	129	2.0	6.0	<2	16	2.5Y 5/4	Ds			
125	341 369	60	15	25	32	68	-	8.5	58	34	122	545	34	135	1.5	5.5	<2	16	*	Ds			
126	326 354	50	13	37	-	100	-	5.7	84	38	120	1402	40	160	2.0	5.9	<2	12	2.5Y 5/4	Ds			
127	252 353	45	23	32	-	100	-	6.1	80	45	124	1080	40	177	2.0	6.0	<2	12	2.5Y 5/4	OSs			
128	256 402	54	25	21	-	100	-	5.7	97	49	145	1214	45	172	2.0	6.3	<2	12	2.5Y 5/4	OSu			
129	208 367	40	16	44	-	100	-	5.6	65	34	128	714	32	147	1.5	5.4	2.0	20	2.5Y 5/4	OSs			
130	384 399	37	5	58	79	21	-	6.0	76	34	149	455	39	154	1.5	5.6	<2	16	2.5Y 5/4	Ds			
131	502 482	39	9	52	-	100	-	*	35	34	107	518	32	103	1.5	4.5	<2	20	5Y 4.5/3	Ds			
132	466 406	29	15	56	-	100	-	*	72	41	103	661	30	146	1.5	5.6	<2	20	2.5Y 4.5/4	Ds			
133	485 370	81	10	9	-	100	-	*	57	68	117	929	37	125	2.0	6.2	*	*	2.5Y 7/6	Ds			
134	337 538	41	14	45	-	100	-	6.2	64	45	121	768	34	186	2.0	5.5	2.0	24	2.5Y 5/4	OSs			
135	369 535	31	17	52	-	100	-	5.7	80	49	141	866	36	176	1.5	6.2	<2	24	2.5Y 5/4	OSs			
136	372 568	41	20	39	-	100	-	5.8	48	30	101	518	27	120	1.5	4.9	<2	20	10YR 5/6	OSs			
137	480 611	53	15	32	-	100	-	6.3	72	41	129	813	32	145	2.0	5.6	2.0	24	2.5Y 5/4	OSs			
138	468 553	23	11	66	-	80	20	6.6	54	38	119	571	30	107	1.5	5.0	<2	16	7.5YR 5/4	OSu			
139	222 602	29	22	49	-	100	-	6.7	75	41	133	920	37	130	1.5	6.1	<2	20	2.5Y 5/4	OSs			
140	265 600	50	18	32	-	100	-	5.7	*	*	*	*	*	*	*	*	*	*	*	Os			
141	282 547	84	10	6	-	100	-	5.5	*	*	*	*	*	*	*	*	*	*	*	Os			
142	303 587	53	15	32	-	100	-	5.6	61	38	115	732	33	143	2.0	5.4	<2	20	*	Os			
144	453 535	52	15	33	-	94	6	*	61	41	99	1170	36	117	1.5	5.2	2.0	24	*	Duv-Ds			
146	409 462	49	18	33	-	100	-	*	55	34	113	804	35	106	1.5	4.9	2.0	24	*	Ds			
147	174 351	59	12	29	2	98	-	5.7	73	45	121	946	42	193	2.0	5.8	2.0	24	*	OSs			
148	163 380	57	10	33	13	87	-	8.5	63	41	113	536	33	145	1.5	5.3	<2	20	*	Os			
149	145 404	40	14	46	16	84	-	7.6	80	49	122	705	45	191	2.0	5.8	<2	20	*	Os			
150	175 443	43	27	30	-	100	-	6.1	66	68	118	1714	64	205	3.0	6.2	<2	*	*	Os			
152	192 536	66	14	20	-	100	-	5.5	*	*	*	*	*	*	*	*	*	*	*	Os			
153	307 498	67	13	20	-	100	-	5.5	83	41	138	2045	52	141	2.0	5.5	<2	20	*	OSs			

Concentration in ppm, except for Fe which is in percent

* No Available Data

Texture: Gravel (>1.18 mm) - Sand (1.18 mm to 75 µm) - Silt and Clay (<75 µm)

Bedrock Formations after Irrinki and Crouse (in preparation)

Ds, Duv - Wapske Formation

OSu - Unnamed Unit

OSs - Matapedia Group

Os - Grog Brook Group

APPENDIX E

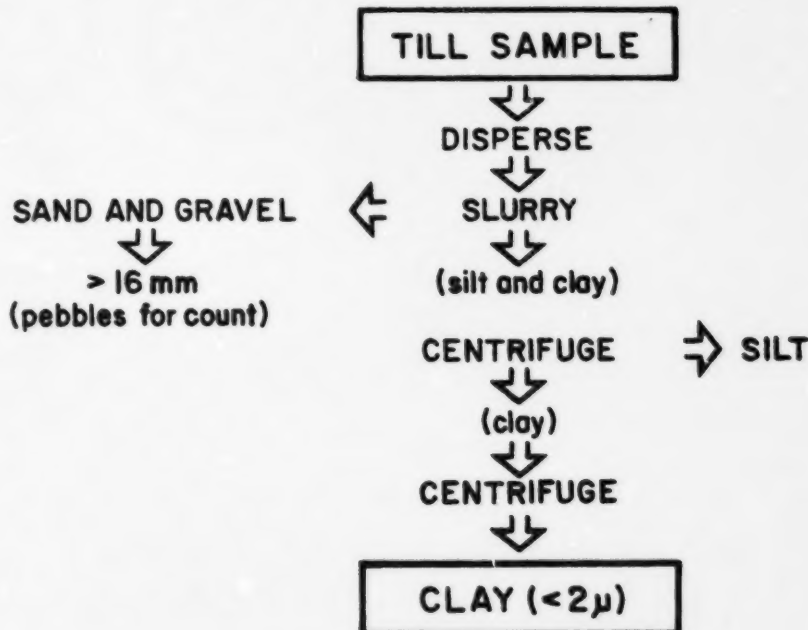
DATA ACQUISITION METHODS

GRANULOMETRY OF TILLS

Dry samples were weighed, then wet-sieved through three screens: 16 mm, 1.8 mm, and 75 μ . The three fractions obtained on the screens were dried overnight in an oven at 90°C. and then weighed. The total weight of the three fractions was subtracted from the initial weight to obtain the weight of silt and clay in the sample. The fraction passing through the 1.18 mm sieve and collecting on the 75 μ sieve was identified as the sand fraction. The gravel fraction consisted of the material coarser than 1.18 mm. Material coarser than 16 mm was further subdivided as coarse gravel.

GEOCHEMICAL ANALYSIS OF TILLS

A) Extraction of the clay size fraction (< 2 μ): The method used followed the "wet" clay separation procedure developed by Higgins et al. of the Geological Survey of Canada and is outlined below.



B) Chemical analysis: Eight elements, Cu, Pb, Zn, Mn, Fe, Ag, Co, and Ni were analyzed by the atomic absorption method, whereas Mo and W were analyzed by the colorimetric method. The methods used are outlined in Chandra et al. (1984).

DETERMINATION OF pH

A sample of the till was ground finely by mortar and pestle and sieved through a #100 brass mesh sieve (150 μ). About 10 ml of the powdered samples was put in a 50 ml beaker and mixed with distilled and deionized water to the 50 ml mark. After stirring, the mixture was left to stand for 20 seconds, then the pH value was read from the instrument (Model 701 Digital pH metre, Orion Research). Each sample was analyzed twice and the average value was tabulated.

COLOR OF THE TILL

The till color was determined in the field by comparing a moist sample with Munsell soil color charts.